

Utah State University

DigitalCommons@USU

All U.S. Government Documents (Utah Regional
Depository)

U.S. Government Documents (Utah Regional
Depository)

6-2002

Hill Air Force Base: Archaeological Monitoring of Target and Access Road Development for the TS-5-2 Target Area, Utah Test and Training Range, Tooele County, Utah

Daron Duke
Geo-Marine, Inc.

Follow this and additional works at: <https://digitalcommons.usu.edu/govdocs>



Part of the [Earth Sciences Commons](#), and the [Environmental Sciences Commons](#)

Recommended Citation

Duke, Daron, "Hill Air Force Base: Archaeological Monitoring of Target and Access Road Development for the TS-5-2 Target Area, Utah Test and Training Range, Tooele County, Utah" (2002). *All U.S. Government Documents (Utah Regional Depository)*. Paper 145.

<https://digitalcommons.usu.edu/govdocs/145>

This Report is brought to you for free and open access by the U.S. Government Documents (Utah Regional Depository) at DigitalCommons@USU. It has been accepted for inclusion in All U.S. Government Documents (Utah Regional Depository) by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.





June 2002

Hill Air Force Base

**Archaeological Monitoring of Target and Access Road Development
for the TS-5-2 Target Area, Utah Test and Training Range,
Tooele County, Utah**

**United States Air Force
Air Combat Command**

20030801 045

Global Power for America

DISTRIBUTION STATEMENT A:

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION IS UNLIMITED

DISTRIBUTION STATEMENT B:

DISTRIBUTION AUTHORIZED TO U.S. GOVERNMENT AGENCIES ONLY;
(Indicate Reason and Date Below). OTHER REQUESTS FOR THIS DOCUMENT SHALL BE REFERRED
TO (Indicate Controlling DoD Office Below).

DISTRIBUTION STATEMENT C:

DISTRIBUTION AUTHORIZED TO U.S. GOVERNMENT AGENCIES AND THEIR CONTRACTORS;
(Indicate Reason and Date Below). OTHER REQUESTS FOR THIS DOCUMENT SHALL BE REFERRED
TO (Indicate Controlling DoD Office Below).

DISTRIBUTION STATEMENT D:

DISTRIBUTION AUTHORIZED TO DOD AND U.S. DOD CONTRACTORS ONLY; (Indicate Reason
and Date Below). OTHER REQUESTS SHALL BE REFERRED TO (Indicate Controlling DoD Office Below).

DISTRIBUTION STATEMENT E:

DISTRIBUTION AUTHORIZED TO DOD COMPONENTS ONLY; (Indicate Reason and Date Below).
OTHER REQUESTS SHALL BE REFERRED TO (Indicate Controlling DoD Office Below).

DISTRIBUTION STATEMENT F:

FURTHER DISSEMINATION ONLY AS DIRECTED BY (Indicate Controlling DoD Office and Date
Below) or HIGHER DOD AUTHORITY.

DISTRIBUTION STATEMENT X:

DISTRIBUTION AUTHORIZED TO U.S. GOVERNMENT AGENCIES AND PRIVATE INDIVIDUALS
OR ENTERPRISES ELIGIBLE TO OBTAIN EXPORT-CONTROLLED TECHNICAL DATA IN ACCORDANCE
WITH DOD DIRECTIVE 5230.25, WITHHOLDING OF UNCLASSIFIED TECHNICAL DATA FROM PUBLIC
DISCLOSURE, 6 Nov 1984 (Indicate date of determination). CONTROLLING DOD OFFICE IS (Indicate
Controlling DoD Office).

The cited documents has been reviewed by competent authority and the following distribution statement is
hereby authorized.

A

(Statement)

NO SENSITIVE INFO
DISCUSSED

(Reason)

JAY R. NEWMAN

Jay R. Newman
(Signature & Typed Name)

US ARMY ENGINEERS
FT. WORTH DISTRICT

(Controlling DoD Office Name)

P.O. BOX 17300
FT. WORTH TX. 76102-
0300

(Controlling DoD Office Address,
City, State, Zip)

CESWF-PER-EC
(Assigning Office)

7/25/03
(Date Statement Assigned)

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE June 2002	3. REPORT TYPE AND DATES COVERED Final January 2001-June 2002		
4. TITLE AND SUBTITLE Hill Air Force Base: Archaeological Monitoring of Target and Access Road Development for the TS-5-2 Target Area, Utah Test and Training Range, Tooele County, Utah		5. FUNDING NUMBERS Contract No. DACA63-99-D-0010 Delivery Order No. 0024		
6. AUTHOR(S) Daron Duke				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Geo-Marine, Inc. 2255-A Renaissance Drive Las Vegas, Nevada 89119		8. PERFORMING ORGANIZATION REPORT NUMBER Geo-Marine, Inc. U.S. Air Force Air Combat Command Series Reports of Investigations Number 12		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers, Fort Worth District PO Box 17300 Fort Worth, Texas 76102-0300		10. SPONSORING/MONITORING AGENCY REPORT NUMBER		
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION AVAILABILITY STATEMENT Approved for public release		12b. DISTRIBUTION CODE		
13. ABSTRACT (Maximum 200 words) The U.S. Army Corps of Engineers, Fort Worth District, contracted with Geo-Marine, Inc., to conduct archaeological monitoring for a U.S. Air Force Air Combat Command (ACC) project on the Utah Test and Training Range (UTTR), which is under the jurisdiction of Hill Air Force Base and located in Tooele County, western Utah. Monitoring of ground disturbing activities associated with ACC development of Target TS-5-2 and a 2.5-mile dirt access road on the TS-5 (Wild Isle) area of UTTR was undertaken in January 2001. Additional target and access road development monitoring was conducted in July and August of 2001, and the results of this work is included as an addendum in this volume. The TS-5-2 project area consisted of the target complex and the access road, both of which required construction. The removal of vegetation and a thin layer of soil, typically less than 2-3 feet below the surface, by a bulldozer was to be the primary impact. The monitoring objective was to assure that known sites were avoided and to verify that the nearby sites did not extend into the proposed roadway. Other monitoring considerations included heavy equipment activity outside of the intended roadway and future bombing at the target area. The results of the monitoring and geomorphological investigations indicate that development of the TS-5-2 access road and target area will have no effect on cultural resources.				
Name of Federal Technical Responsible Individual: Dr. Jay R. Newman Organization: U.S. Army Corps of Engineers, Fort Worth District, CESWF-EV-EC Phone #: (817) 886-1721				
14. SUBJECT TERMS Archaeological monitoring, Utah Test and Training Range, Hill Air Force Base, Tooele County, TS-5-2		15. NUMBER OF PAGES 24 + Appendices		
		16. PRICE CODE		
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	

HILL AIR FORCE BASE

ARCHAEOLOGICAL MONITORING OF TARGET AND ACCESS ROAD DEVELOPMENT FOR THE TS-5-2 TARGET AREA, UTAH TEST AND TRAINING RANGE, TOOELE COUNTY, UTAH



**HEADQUARTERS AIR COMBAT COMMAND
JUNE 2002**

MANAGEMENT SUMMARY

The U.S. Army Corps of Engineers, Fort Worth District, contracted with Geo-Marine, Inc. (GMI), to conduct archaeological monitoring for a U.S. Air Force Air Combat Command (ACC) project on the Utah Test and Training Range (UTTR), which is under the jurisdiction of Hill Air Force Base and located in Tooele County, western Utah. Monitoring of ground-disturbing activities associated with ACC development of Target TS-5-2 and a 2.5-mile dirt access road on the TS-5 (Wild Isle) area of UTTR was undertaken in January 2001. The work was conducted under Antiquities Annual Permit No. U-01-GM and in compliance with the National Historic Preservation Act of 1966, as amended through 2000.

The TS-5-2 project area consisted of the target complex and the access road, both of which required construction. The removal of vegetation and a thin layer of soil, typically less than 2 feet below the surface, by a bulldozer was to be the primary impact. Previous archaeological surveys of the entire TS-5 area had documented numerous sites and had identified the area as possessing potential for containing important buried cultural deposits beneath the sand dunes. Based on these surveys, the road and target area were designed to avoid known sites, but the road route passed adjacent to several recorded sites. The monitoring objective was to assure that known sites were avoided and to verify that the nearby sites did not extend into the proposed roadway. Other monitoring considerations included heavy equipment activity outside of the intended roadway and future bombing at the target area. Because of the potential for buried sites, deep shovel probes, in addition to monitoring, were planned to access subsurface deposits in the target area. The availability of a backhoe, however, provided the opportunity to document the geomorphological structure of the TS-5 landform. Although no cultural material was found, subsurface geomorphological data that were collected can aid future archaeological work on TS-5. The results of the monitoring and geomorphological investigations indicate that development of the TS-5-2 access road and target area will have no effect on cultural resources.

TABLE OF CONTENTS

MANAGEMENT SUMMARY	iii
ACKNOWLEDGMENTS	xi
1. INTRODUCTION	1
2. PROJECT SETTING.....	5
Natural Setting	5
Cultural Setting.....	5
3. RESULTS OF THE TS-5-2 MONITORING PROJECT	7
Access Road.....	7
Target Area	8
Monitoring.....	8
Geomorphological Investigations within the TS-5-2 Target Area	12
Methodology	12
Backhoe Trench Findings	14
4. SUMMARY AND RECOMMENDATIONS	21
REFERENCES CITED	23
APPENDICES:	
A: STANDARD OPERATING PROCEDURES.....	A-1
B: REPORT ADDENDUM: FURTHER MONITORING OF TS-5-2 TARGET DEVELOPMENT	B-1

LIST OF FIGURES

1. Map of TS-5-2 and project area.....	2
2. Overview of access road	3
3. Target TS-5-2 as viewed from west end of access road	3
4. Map of the monitored area, showing location of Target TS-5-2, access road, modified right-of-way, sensitive areas, known archaeological sites, isolated finds, and shovel probes.....	9
5. Overview of Sensitive Area 1	11
6. Biface (IF #3) from Sensitive Area 3	12
7. Locations of backhoe trenches in Target TS-5-2	13
8. Composite profile of Trenches 1 and 2 at TS-5-2.....	15
9. Profile sections for Trenches 3, 4, 5, 6, 7, 8, and 9 at TS-5-2	17
10. Alluvial sand bed in Trench 1.....	19
11. Alluvial sand bed in Trench 2.....	19

LIST OF TABLES

1. Eastern Great Basin Culture Sequence	6
2. Isolated Artifacts Recorded on TS-5-2 Monitoring Project	11

ACKNOWLEDGMENTS

The successful completion of this project is owed to the efforts of those involved in its development. Dr. Paul Green of the U.S. Air Force Air Combat Command, Mr. Martyn Tagg of the Air Force Materiel Command, and Mr. Sam Johnson and Mr. Tom Nass of the 388th Range Squadron were all integral in implementing a plan that responsibly managed cultural resources concerns while achieving the Air Force mission. Dr. Jay Newman of U.S. Army Corps of Engineers, Fort Worth District, provided guidance and advice throughout the project. The cooperative spirit of these individuals carried into the field through construction manager Mr. Tom Nass and his field crew. Hill Air Force Base Cultural Resource Manager, Ms. Debbie Hall, and archaeologist, Ms. Jaynie Hirschi, were instrumental in providing information about the archaeology of TS-5, as was Dugway Cultural Resource Manager Ms. Kathy Callister who provided information about related archaeological data south of the project area. Ms. Hirschi's assistance in the field is also greatly appreciated. Finally, Geo-Marine, Inc., would like to thank Mr. Jim Carter of Historic Research Associates, Inc., for eagerly discussing his knowledge of the archaeology of TS-5, and Mr. Craig Young, of Far Western Anthropological Research Group, Inc., for his geomorphological analysis of backhoe trenches.

CHAPTER 1

INTRODUCTION

The U.S. Army Corps of Engineers, Fort Worth District, contracted with Geo-Marine, Inc. (GMI), to conduct archaeological monitoring for a U.S. Air Force Air Combat Command (ACC) project on the Utah Test and Training Range (UTTR), which is under the jurisdiction of Hill Air Force Base (HAFB) and located in Tooele County, western Utah. ACC and the 388th Range Squadron, as Hill Air Force Base and U.S. Air Force Materiel Command (AFMC) tenants on UTTR, assist in cultural resources investigations initiated by their activities. Monitoring of ground disturbing activities associated with ACC development of Target TS-5-2 and a 2.5-mile dirt access road on the TS-5 (Wild Isle) area of UTTR was undertaken in January 2001 by GMI project archaeologist Daron Duke and Hill Air Force Base archaeologist Jaynie Hirschi. This work was conducted under Antiquities Annual Permit No. U-01-GM and in compliance with the National Historic Preservation Act of 1966, as amended through 2000 [16 U.S.C. § 470 et seq., P.L. 89-665, Stat. 915].

The TS-5-2 project area consisted of the target complex and the access road, both of which required construction (Figures 1, 2, and 3). The removal of vegetation and a thin layer of soil by a bulldozer was the primary impact. Soil disturbance was typically less than 2 feet below the surface, except when necessary to push through small sand dunes. Other monitoring considerations included heavy equipment activity outside the intended roadway and future bombing at the target. The HAFB cultural resources management plan (CRMP) specifies that any ground-disturbing activities in such areas require archaeological monitoring to ensure proper treatment of any new discoveries and to ensure avoidance of recorded sites. Prior to fieldwork, a Standard Operating Procedure (plan of work) for monitoring was developed by GMI archaeologists (Appendix A).

An environmental assessment (Radian International 2000) resulted in a Finding of No Significant Impact (FONSI) for the TS-5 area, but previous archaeological surveys conducted for the entire TS-5 area have documented numerous archaeological sites and identified the area as possessing potential for containing important buried cultural deposits beneath the sand dunes. Although information from the previous surveys was used to design the road and target area to avoid known sites, the road route passed adjacent to several recorded sites. In the target area, deep shovel probes as well as monitoring were planned to access subsurface deposits because of the potential for buried sites. The availability of a backhoe, however, provided the opportunity to document

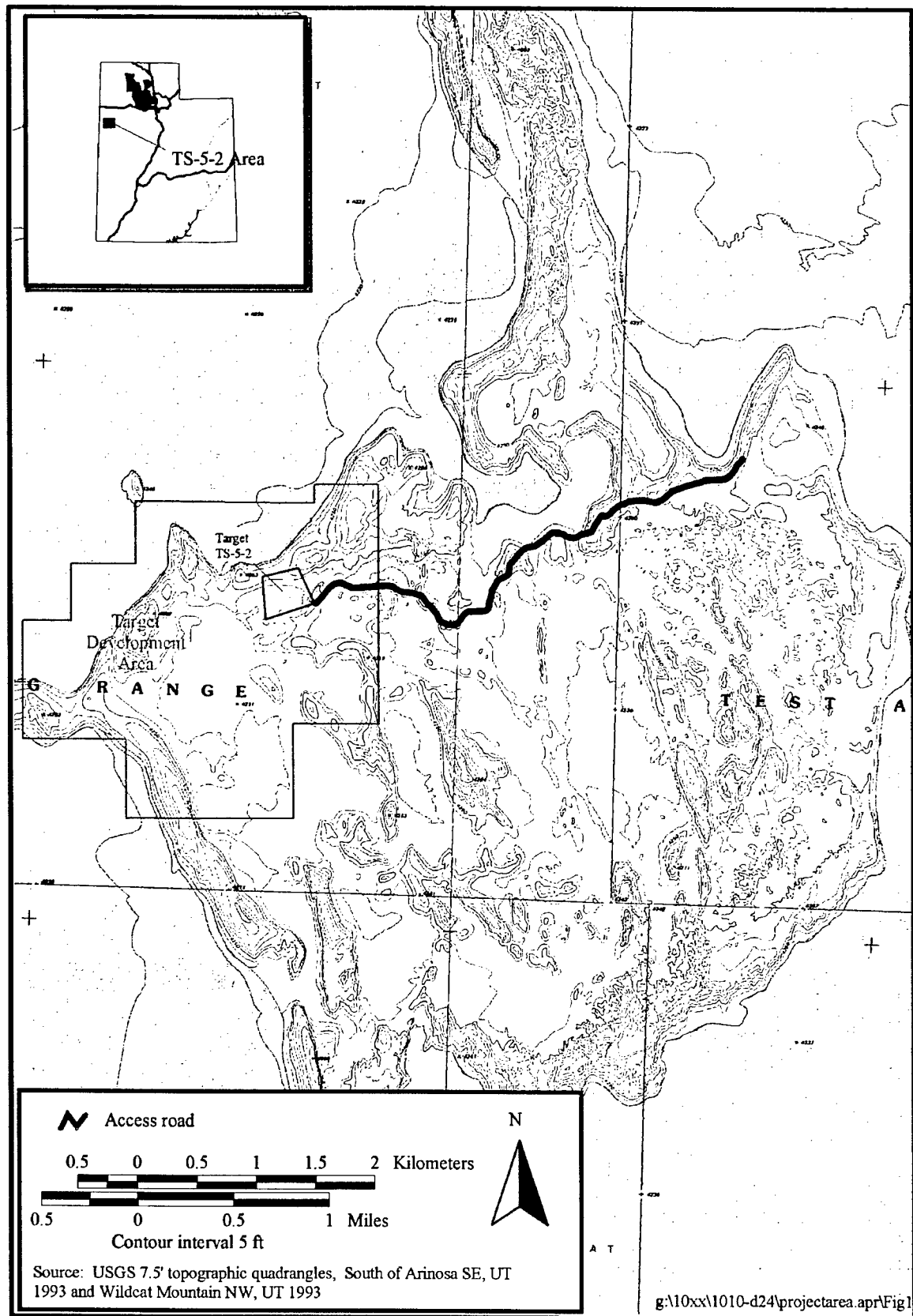


Figure 1. Map of TS-5-2 and project area.



Figure 2. Overview of access road.



Figure 3. Target TS-5-2 as viewed from west end of access road.

the geomorphological structure of the TS-5 landform. No cultural material was found, but the subsurface geomorphological data that were collected can aid future archaeological work on TS-5.

Construction of the 2.5-mile access road began at the end of an unnamed gravel road in the northeast corner of the northwest corner of the southeast corner of Section 19, Township 4 South, Range 14 West, and trended southwest to the TS-5-2 target area location in the northeast corner of the northwest corner of Section 26, Township 4 South, Range 15 West.

The impacts and monitoring concerns unique to the road and target are discussed in this report in separate sections devoted to each area. Each section begins with the monitoring concerns relevant to the area, followed by the methods and in-field recommendations made regarding cultural resources, and, finally, by any archaeological findings. Few artifacts were observed, and methods of artifact analysis are discussed as necessary. A summary of the monitoring project and the recommendations completes the report.

CHAPTER 2

PROJECT SETTING

NATURAL SETTING

Target TS-5-2 and the access road are located in the northern portion of the TS-5 dune complex, which is situated in the southern Great Salt Lake Desert. Vegetation is desert scrub, consisting of plants such as pickleweed (*Allenrolfea occidentalis*), greasewood (*Sarcobatus vermiculatus*) and shadscale (*Atriplex confertifolia*). Small mammals, reptiles, and birds are common. Many rabbits, particularly the black-tailed jack rabbit (*Lepus californicus*) and desert cottontail (*Sylvilagus audubonii*), and small rodents can be found in this environmental setting. Thorough discussions of the TS-5 landform and environment are found in previous archaeological survey reports (Arkush 1997; Carter 1999; Carter and Young 2002).

CULTURAL SETTING

Three previous surveys have been conducted in the project area and constitute a 100 percent survey of the TS-5 landform. Arkush (1997) surveyed the Central Area of TS-5, which is a 1.25-mile-wide corridor that runs the length of the middle of the landform north-south, and recorded two sites, both possessing Western Stemmed series projectile points diagnostic of the Paleoarchaic Bonneville period dating 11,000–9,500 years ago (Table 1). Another inventory by Weder and Ugan (2000) resulted in two more sites. Survey by Historic Research Associates, Inc. (HRA), in the remaining portions of TS-5 (Carter 1999), as well as a resurvey of the Central Area (Carter and Young 2002) previously inventoried by Arkush (1997), resulted in the recording of 91 more sites. These are typically lithic scatters dominated by obsidian and basalt located in dune blowouts, many of which date to the Paleoarchaic based on the presence of Western Stemmed points. The HRA survey of the Central Area resulted in a predominance of Western Stemmed series points at sites. These sites have been plotted by HAFB, and several constitute the known cultural resources avoided on the current project. These are detailed in the discussion of access road monitoring in Chapter 3.

Table 1
Eastern Great Basin Culture Sequence¹

	Cultural Era	Regional Period	Diagnostic Point Styles
"Paleoarchaic"	Paleoindian (13,000-10,500 BP ²)	--	fluted points
	Early Archaic	Bonneville (11,000-9,500 BP)	Western Stemmed series
		Wendover (9,500-6,000 BP)	Pinto, Humboldt, Large Side-notched
	Middle Archaic	Black Rock (6,000-1,500 BP)	Elko, Gypsum, Humboldt
	Late Archaic	Fremont (1,500-700 BP)	Rose Spring, Eastgate
	Late Prehistoric (700-150 BP)	--	Desert Side-notched, Cottonwood
	Historic (1850-1951 A.D.)	--	--

¹see Aikens and Madsen (1986), Carter 1999, Marwitt 1986, Willig and Aikens (1989)

²BP=before present

TS-5 is unique for its extensive deposits of Paleoarchaic artifacts associated with the Western Stemmed tradition. The artifacts consist of basalt and obsidian flaked stone artifacts, stemmed points, bifaces, and debitage. They are typically located in dune blowouts where small mudflats are present. Carter (1999) argues that these sites sit on deflated surfaces, but suggests the possibility that an original living surface containing intact dateable deposits, such as hearths with charcoal, wood, bone, or seeds, may be present beneath adjacent dunes where they are protected from erosional processes.

Geomorphologic features indicate that the original surface on which Paleoarchaic people lived would have looked dramatically different from the TS-5 surface of today (Carter 1999:18). It is possible the modern dune complex is seated on remnant deltaic landforms produced at the mouth of the Old River, which drained the Sevier Desert basin during the final regressive stages of Lake Bonneville. This explanation provides some insight into the reason for extensive Paleoarchaic deposits compared to later material. Paleoarchaic groups likely occupied an area with fresh water and rich marsh-associated resources. Later peoples would have encountered a setting increasingly similar to that of the modern era containing limited plant and animal resources, but no fresh water.

CHAPTER 3

RESULTS OF THE TS-5-2 MONITORING PROJECT

ACCESS ROAD

The dirt access road begins at the termination of an established unnamed road and extends approximately 2.5 miles southwest to the Target TS-5-2 location (Figure 4). It measures 40 feet (ft) wide, but a 400-ft-wide corridor was monitored to accommodate the potential for impacts by heavy equipment and vehicle turnaround activity. The depth of impacts was typically less than two feet unless it was necessary to push through small sand dunes. The primary monitoring objective was to avoid known sites and verify that these sites did not extend into the proposed roadway. This objective required some survey reconnaissance in advance of road construction. One day was used for surface inspection of the proposed route and shovel testing in sensitive areas. When road construction began, archaeologists were always present to observe for cultural deposits.

Four areas of highest archaeological potential, designated "sensitive areas" (SA), were established along the proposed route in order to better manage the potential impacts of road building. Based on the previous archaeological surveys of TS-5 (Arkush 1997; Carter 1999; Carter and Young 2002), sites dating to the Paleoarchaic were expected to be limited to dune blowouts and playa settings rather than to be found on the tops of dunes. TS-5 dunes appear to have developed later in time. The proposed road route largely followed high ground, but several low spots were also covered, and these were designated SA 1, SA 2, SA 3, and SA 4 (see Figure 4). Figure 4 shows deviations made from the original proposed route. These changes were made by the construction crew to better utilize the natural topography and to generally avoid archaeological sites and endangered plants.

The route corridor (not the roadway itself) passed adjacent to several known sites, but through only one site, 42TO1325. The southern margin of the corridor extended into the northern boundary of the site in the area designated SA 1 (Figure 5; see Figure 4). Like other sites, 42TO1325 is a lithic scatter that may extend underneath adjacent dunes. The corridor extended to within the site boundary, but the 40-ft roadway is situated on top of one of these dunes. Although potential for impact by the road itself appeared to be minimal in this area, nine shovel probes were excavated in the proposed roadway route. These units were placed in three transects—one in the road route and two 5 m away on the north and south sides—of three probes each spaced at

5-m intervals, (see Figure 4). Probes were excavated to 50 cm below the surface (cmbs) and were circular in shape at 30 cm in diameter. Sediments were screened using 0.25-inch wire mesh. No cultural resources were observed, and inspection of the probe sidewalls revealed no evidence of staining or charcoal. Each shovel probe contained light brownish gray (10YR 6/2) fine sandy loam throughout the profile. The monitoring recommendation was made to continue road construction on the proposed route but to restrict turnaround activities on the road's south side. The right-of-way on the south side of the road was narrowed to less than 15 m with no turnaround activity allowable beyond this distance where the dune drops off to the level of 42TO1325.

Sensitive areas 2, 3, and 4 were placed in the blowout/mudflat areas between dunes along the road route that are the typical surface context for sites on TS-5. Although no previously recorded sites are present in these areas, additional surface inspection was conducted before impact by the bulldozer.

Of these remaining three sensitive areas, SA 2 is closest to a known site, 42TO1326, at less than 120 m. Three isolated finds (IF #1, IF #2, IF #4) were recorded outside of the roadway but within the 400-ft corridor (Table 2). These finds consist of two indeterminate basalt flakes and one obsidian biface reduction flake. Indeterminate flakes were defined by their lack of platforms through breakage. The biface reduction flake possesses a platform, with faceting indicative of a bifacial margin. Given the proximity to known cultural resources and the presence of isolates, the right-of-way was limited at SA 2 to the roadway itself with no corridor for turnarounds.

In SA 3, surface reconnaissance resulted in one isolated find, a basalt biface (IF #3; Figure 6). Based on reduction strategies, bifaces can be classified as one of five types: roughout, rough percussion biface, fine percussion biface, rough pressure flaked biface, and fine pressure flaked biface. The IF #3 biface is classified as a rough percussion type. Breakage, the presence/absence of cortex, and the presence and type of use wear were also recorded. An attribute description of IF #3 is presented in Table 2. This artifact was observed on the surface after the bulldozer passed over. The bulldozer typically disturbed little surface sediment when moving across blowouts/mudflats, but rather removed vegetation. The biface appeared to be surficial and became visible upon removal of a bush. With the presence of cultural material, as in SA 2, right-of-way in SA 3 was confined to the roadway proper restricting turnaround activities.

No artifacts were present in SA 4 and no known sites are located nearby; therefore, no modifications to the route or restrictions of the right-of-way were made.

TARGET AREA

Monitoring

Monitoring concerns in the TS-5-2 target area centered on impacts to possible subsurface sites. The surface survey by HRA (Carter 1999) resulted in no sites in this area, but the target area is not located in a dune blowout like those on which sites at TS-5 usually occur. It was believed that sites at TS-5-2 may be present below the surface, under the dunes.

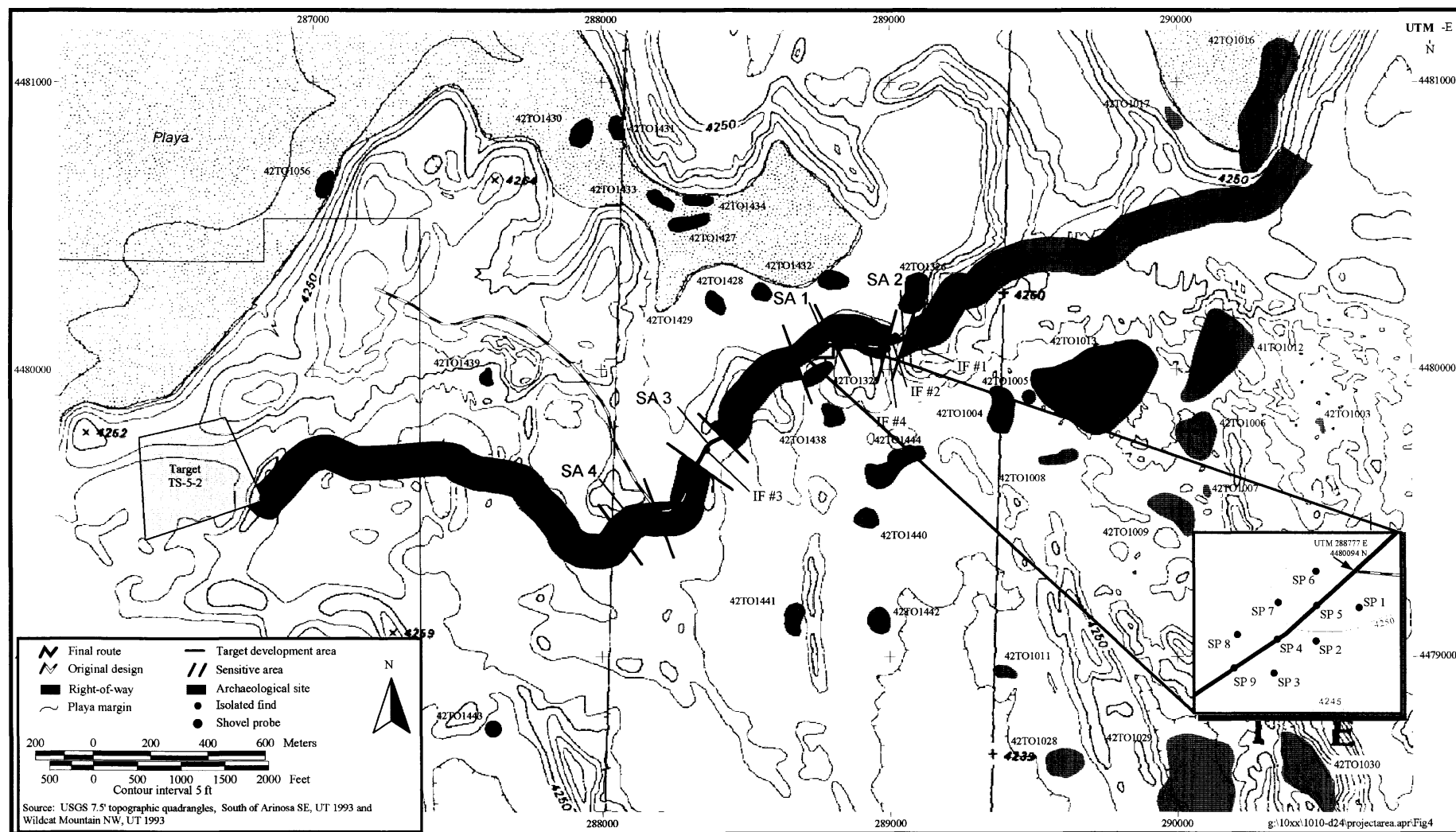


Figure 4. Map of the monitored area, showing location of Target TS-5-2, access road, modified right-of-way, sensitive areas, known archaeological sites, isolated finds, and shovel probes.

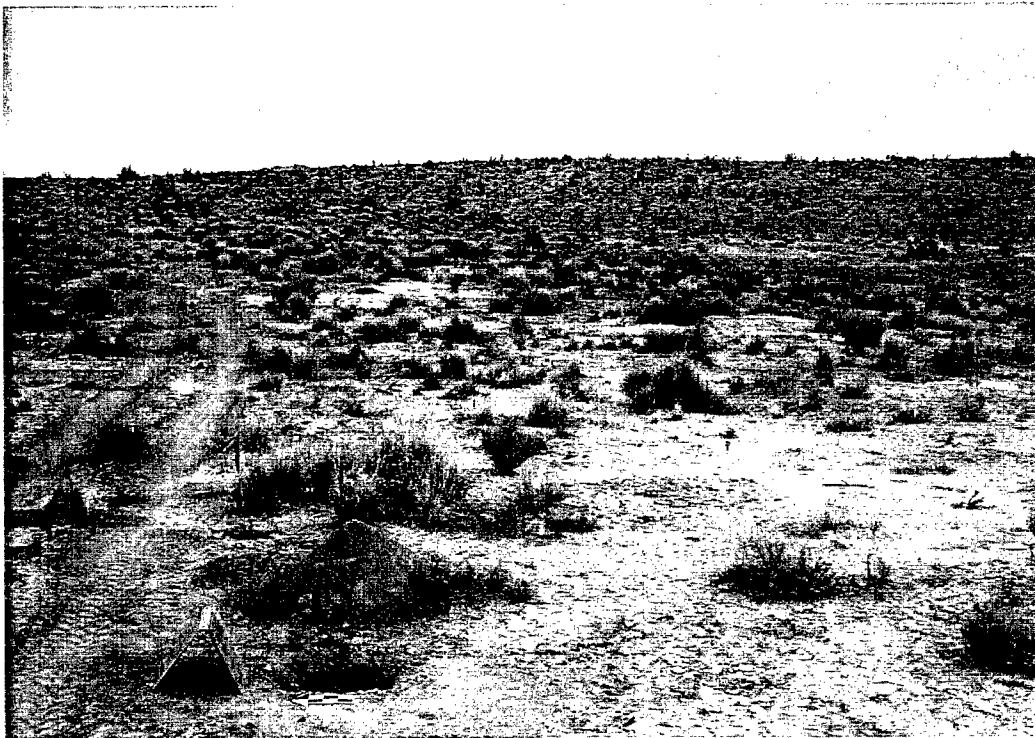


Figure 5. Overview of Sensitive Area 1.

Table 2
Isolated Artifacts Recorded on TS-5-2 Monitoring Project

Artifact #	Material	Location	Provenience (UTM)	Description
IF #1	basalt	SA 2	288823E 4480305N	Indeterminate flake, no cortex
IF #2	basalt	SA 2	289015E 4480298N	Indeterminate flake, no cortex
IF #3*	basalt	SA 3	288303E 4479933N	Rough percussion biface; 35-x-24-x-10 mm; lateral snap at midsection; exhibits edge damage consisting of stepping and rounding, no cortex
IF #4	obsidian	SA 2	288912E 4480245N	Biface reduction flake, no cortex

*collected, curated at Hill Air Force Base

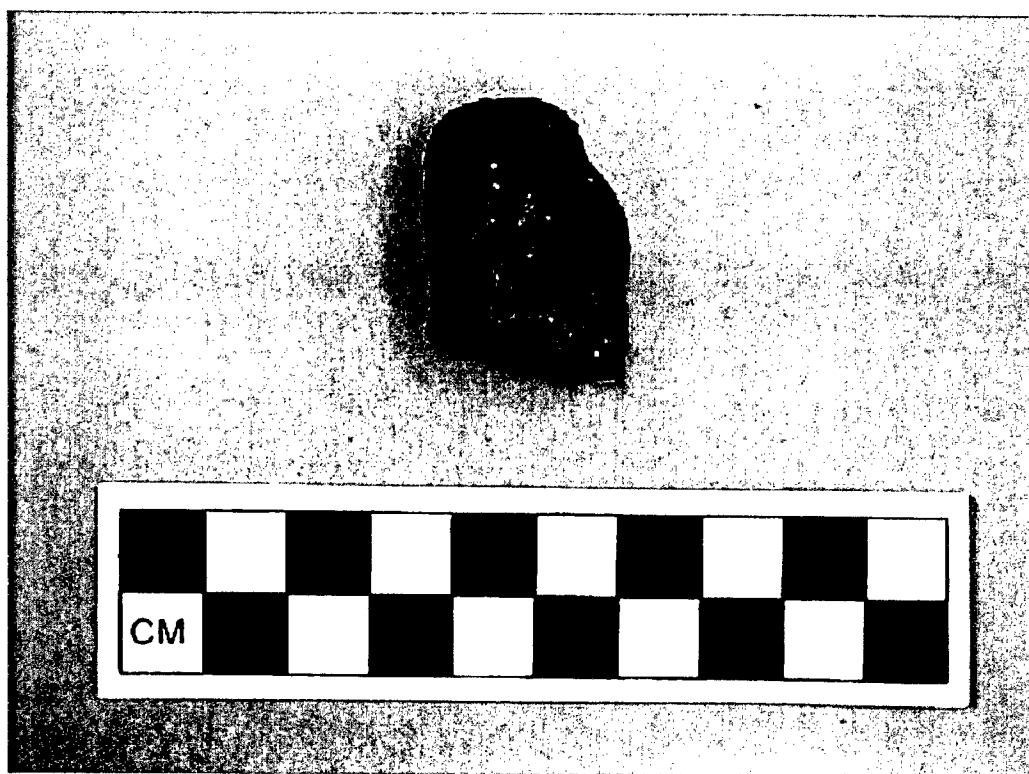


Figure 6. Biface (IF #3) from Sensitive Area 3.

TS-5-2 is set in a topographic depression surrounded by large sand dunes and was designed to be a 300-x-300 ft (90-x-90 m), or 90,000 ft² (8,281 m²) area, cleared off by a bulldozer. Also, road pioneering was to be conducted to each of four video camera locations from the target center. These camera locations (CAM 1, CAM 2, CAM 3, CAM 4) are situated approximately 750-800 ft (230-245 m) northeast, northwest, southeast, and southwest from the target center, defining the corners of a block area roughly 640,000 ft² (19,507 m²) in size (Figure 7). Archaeological monitoring encompassed the entire area within these camera locations.

Geomorphological Investigations within the TS-5-2 Target Area

Methodology

Deep shovel probes (approximately 1 m) were planned to assess the TS-5-2 subsurface prior to bulldozing, but an available backhoe was offered by the 388th Range Squadron to speed excavation and allow for greater subsurface exposure. Personnel of the 388th operated the backhoe while the archaeologists directed excavation and inspected trench side-walls for cultural material. Trench profiles were analyzed by D. Craig Young, of Far Western Anthropological Research Group, Inc., Reno, Nevada, who was contracted by GMI to examine the TS-5-2 trenches. No archaeological material was found, but information on subsurface geomorphology was gained that can simplify future archaeological work on TS-5.

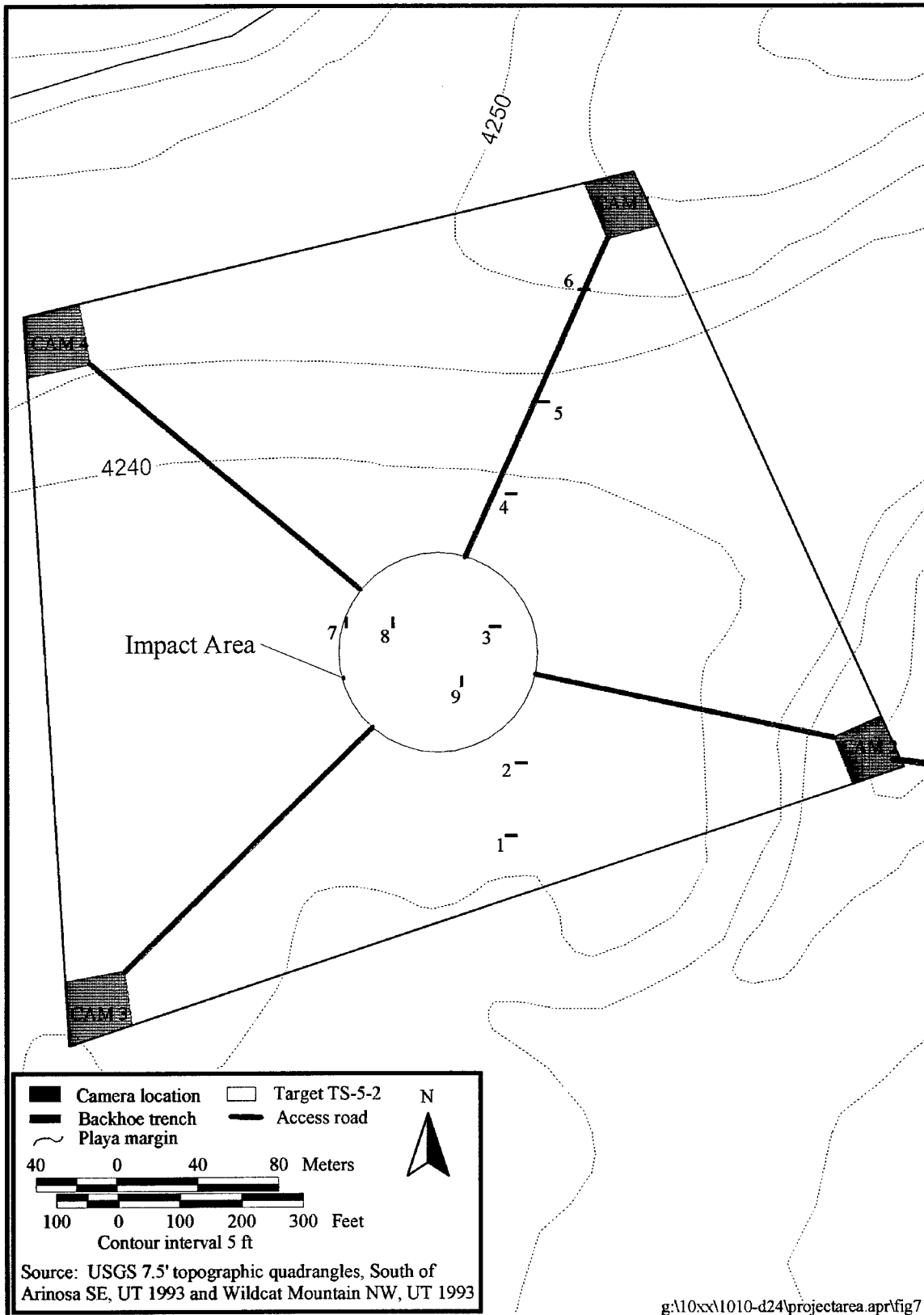


Figure 7. Locations of backhoe trenches in Target TS-5-2.

Nine trenches measuring at least 15 ft (4.6 m) long by 6 ft (1.8 m) deep were excavated. The majority of these were placed in the target area itself since this will be the focus of military bombing activities (see Figure 7). The remaining three trenches were staggered northeast along the road route to CAM 1, and these were used to characterize the dune geomorphology surrounding the target. The surface geomorphology of TS-5 was studied by Young in association with the Central Area inventory by HRA, and the current findings are integrated into that report (Carter and Young 2002).

Backhoe Trench Findings

by D. Craig Young

Mechanical trenching in conjunction with archaeological testing and monitoring of Target TS-5-2 provided the opportunity to document the subsurface geomorphological structure of the TS-5 landform. Although large portions of TS-5 have been subjected to cultural resources inventory, there has been limited opportunity for subsurface investigations. The current efforts supplement geoarchaeological studies conducted during the Central Area survey (Carter and Young 2002). At that time two distinct sedimentary units that inform the attempts to explain the archaeological record discovered at TS-5 were documented. The two units consist of aeolian sediments of the dune landform (reworked sand and silts) and alluvial sediments (clays, medium to fine sands, fine gravels, and gastropod shell in stream channels and berms) that appeared to be stratigraphically below the dune. The aeolian dune is Holocene in age and the local alluvium dates to the Pleistocene/Holocene boundary. A third unit of lacustrine sediments associated with Pleistocene Lake Bonneville was also documented, but the preserved portions of this unit locally predate the archaeological record. The relative stratigraphic relationship between the three units was based on the surface relationships between the sediments and was not confirmed by exposures within the dune.

A series of nine trenches provided stratigraphic profiles of the TS-5-2 area. A representative section of each trench was profiled and photographed. As a group, the trenches provided a complete stratigraphic profile of the landform and underlying sedimentary units. Included are a composite profile for Trenches 1 and 2 (Figure 8) and individual profiles sketches for Trenches 3–9 (Figure 9). The trench profiles showed no evidence of prehistoric or historic artifacts or features. Trenches 1 and 2 were expanded to prevent slumping, and deepened to maximize the stratigraphic exposure. Trench instability and groundwater saturation prevented the development of detailed profile drawings of the deepest portions of the two trenches. The profiles, however, confirmed the unit relationships documented previously.

At least three dune-building episodes, separated by periods of relative stability, formed the profile at TS-5-2. This sequence likely varies little throughout the regional landform, though it is unlikely that all periods of Holocene dune activity and stability are represented at this one location.

The aeolian sediments rest unconformably on alluvium deposited in a braided stream system that drained across the area prior to dune-building. The alluvium consists of well-sorted, medium to fine sands with cross- and scalloped-bedding. Manganese (black) stains are prominent within the sand bed. In the exposed profiles, the alluvial sand bed has a maximum thickness of

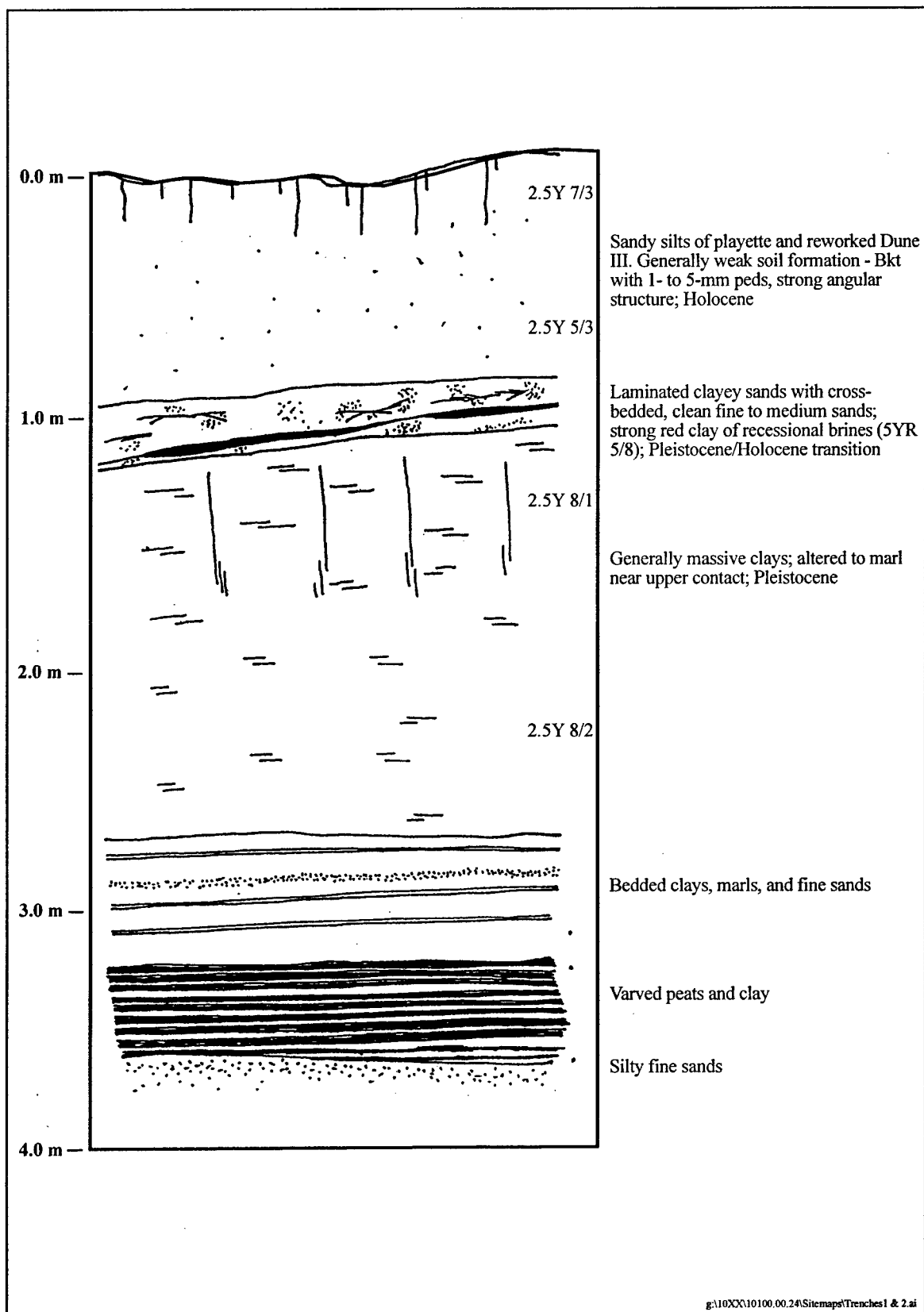


Figure 8. Composite profile of Trenches 1 and 2 at TS-5-2.

approximately 10 inches (25 cm; Figures 10 and 11). Although no distinct channels were observed, the sand bed likely is equivalent to the alluvial unit observed throughout TS-5. Gastropods from that unit have been dated to $9,640 \pm 60$ radiocarbon years B.P. (Beta-120199; Carter 1999).

Archaeological site patterning, based on recent cultural resource inventories (Carter 1999; Carter and Young 2002), suggests that those site assemblages showing Early Holocene affiliation are found on alluvial, and possibly littoral, landforms and not the TS-5 dune. Because the alluvial unit is capped by the dune, the early assemblages may be present in subsurface contexts throughout the landform. Although no archaeological remains were discovered during mechanical trenching at TS-5-2, the excavations confirmed that a sedimentary unit of appropriate age may be regionally present. Recent studies on the Dugway facilities have shown similar relationships and may, in fact, contain earlier archaeological assemblages than so far discovered at TS-5 (Madsen et al. 2000). The record for Middle and Late Holocene occupation of the TS-5 will be limited to the dune area. In active portions of the dune, however, late assemblages may be deflated onto the underlying alluvial and lacustrine units.

The trenching program also exposed a deep record of bedded lacustrine deposits of pluvial Lake Bonneville. The lacustrine unit exposed in Trenches 1 and 2 shows a complex stratigraphy of lake sediments, varved peats and clays, and massive marls. Although this unit predates the regional archaeological record, it may contain significant information for understanding the final stages of the pluvial lake. All of the information collected from the trenches augments previous inventories and contributes to the regional information on early human occupation of the basin during, and immediately following, the final regression of pluvial Lake Bonneville.

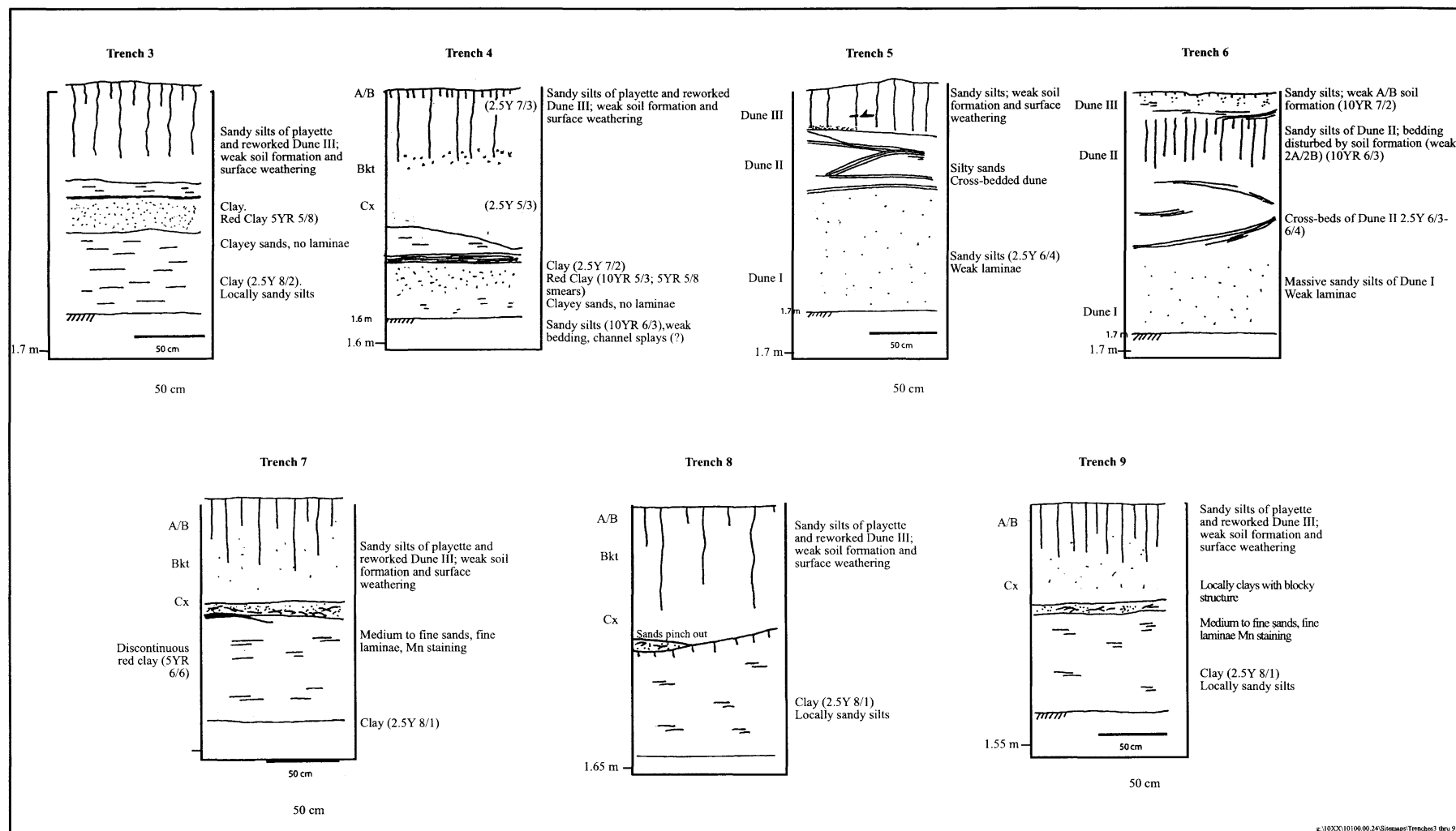


Figure 9. Profile sections for Trenches 3, 4, 5, 6, 7, 8, and 9 at TS-5-2.



Figure 10. Alluvial sand bed in Trench 1.

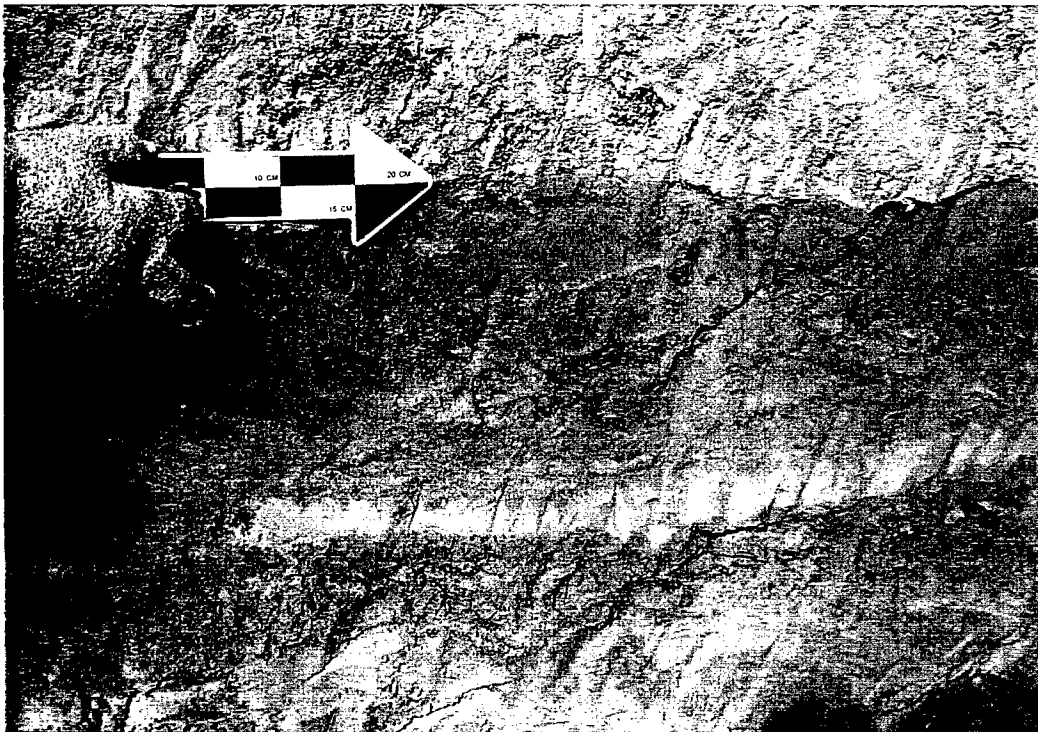


Figure 11. Alluvial sand bed in Trench 2.

CHAPTER 4

SUMMARY AND RECOMMENDATIONS

Archaeological monitoring of road and target building activities revealed no substantial cultural resources. With the exception of narrowing the corridor surrounding the road in several sensitive areas (see Figure 2), both the TS-5-2 target area and the 2.5-mile access road were developed largely according to the target location and road route preferred by the 388th Range Squadron. The modifications to the access road corridor were made to protect nearby cultural resources from damage by heavy equipment during road construction and any future road maintenance. Other areas within the 400-ft corridor as well as within the TS-5-2 target area bound by the video camera stations are cleared for activity.

Several observations made during the project are relevant to the archaeology of TS-5 and future archaeological studies in this area. Monitoring of the road pioneering supports the assessment by on previous inventories (Carter 1999; Carter and Young 2002) that Paleoarchaic sites lay beneath the sand dunes, which developed later in time. Road construction activities uncovered no artifacts or features on the dunes adjacent to known sites.

Carter (1999) has stated that the reason for the lack of sites in the western portion of TS-5 compared to other areas of lower elevation may be that sites remain covered. Backhoe trenching was conducted by the 388th Range Squadron and GMI in the TS-5-2 area to identify any subsurface cultural deposits. This monitored area consisted of the target area itself within a larger block area defined by four proposed video camera locations overlooking the target from the surrounding dunes. No cultural resources were found, but trenches in the target area did reveal a stratigraphic unit where artifacts could potentially be present elsewhere on TS-5. A sand bed no greater than 25 cm thick occurs approximately 1 m below the surface in the target area and appears to have been deposited by braided stream channels present in the past. Paleoarchaic occupation may have been associated with this stream system. This same sedimentary unit is exposed at the surface of sites in the central and eastern portions of TS-5, suggesting that the layer underlies the entire TS-5 dune complex. This unit can serve as a diagnostic stratigraphic indicator for future subsurface investigations in this area.

Monitoring of the TS-5-2 target and road development was conducted in compliance with the NHPA and the HAFB CRMP. The project was completed without impact to important cultural resources. Backhoe trenches in the TS-5-2 target area revealed a stratigraphic link to the known

Paleoarchaic sites on the surface in other parts of TS-5. Future archaeological monitoring of projects on TS-5 should take these associations into consideration. When activities will impact low-lying areas between dunes where the stream channel deposits are not exposed, subsurface testing should focus on the identification of these deposits and inspection of the neighboring sediments for Paleoarchaic cultural resources. When these sites are tested, excavations should center on investigating the exact nature of the stratigraphic relationship between the archaeological material and stream channels and finding intact deposits. Dune settings contain younger, and limited, cultural material. Monitoring on the dunes should continue to carefully consider the potential impacts to known and possibly buried Paleoarchaic sites, but at the same time be aware of the possibility for more recent cultural deposits of significance on the dunes.

REFERENCES CITED

Aikens, C. M., and D. B. Madsen

- 1986 Prehistory of the Eastern Area. In *Great Basin*, edited by W. L. d'Azevedo, pp. 149-160. Handbook of North American Indians, Vol. 11, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Arkush, B.

- 1997 *An Archaeological Assessment of U.S. Air Force Utah Test and Training Range: The 1996 Field Season*. Submitted to Directorate of Environmental Management, Ogden Air Logistics Center, Hill Air Force Base, Contract No. F42650-93-D-0053-5004. Copies available from Hill Air Force Base, Ogden, Utah.

Carter, J.

- 1999 *TS-5 Target Complex Cultural Resource Inventory, Wendover Air Force Range, Tooele County, Utah*. Submitted to Hill Air Force Base and National Park Service, Contract No. 1443-CX-1200-94-024. Copies available from Hill Air Force Base, Ogden.

Carter, J., and D. C. Young

- 2002 *TS-5 Central Area and Craners Cultural Resources Inventory, Utah Test and Training Range, Tooele and Box Elder Counties, Utah*. Historical Research Associates, Inc. Submitted to Hill Air Force Base and National Park Service, Contract No. 1443-CX-2000-99-003. Copies available from Hill Air Force Base, Ogden.

Madsen, D. B., C. G. Oviatt, D. N. Schmitt and K. Callister

- 2000 *The Paleoarchaic Occupation of the Old River Bed Delta, Utah: Environmental Context and Chronology*. Paper presented at the 27th Great Basin Anthropological Conference, Ogden, Utah.

Marwitt, J. P.

- 1986 Freemont Cultures. In *Great Basin*, edited by W. L. d'Azevedo, pp. 161-172. Handbook of North American Indians, vol. 11, W. C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Radian International

- 2000 *EA for Proposed Multiple Targets TS-5, UTTR-South, Hill Air Force Base, Utah*. Submitted to Hill Air Force Base, Contract No. F42650-92-D-0007. Copies available from Hill Air Force Base, Ogden, Utah.

Weder, D. G., and A. Ugan

- 2000 *WCMD (West TS-5-1 Area) Target and Access Road*. Report prepared for U.S. Department of Defense, Hill Air Force Base, Ogden, Utah.

Willig, J. A., and C. M. Aikens

- 1989 The Clovis-Archaic Interface in Far Western North America. In *Early Human Occupation in the Far Western North America: The Clovis-Archaic Interface*, edited by J. A. Willig, C. M. Aikens, and J. L. Fagan, pp. 1-40. Anthropological Papers No. 21, Nevada State Museum, Carson City, Utah.

APPENDIX A
STANDARD OPERATING PROCEDURES

CULTURAL RESOURCES STANDARD OPERATING PROCEDURES (SOP) FOR DEVELOPMENT OF THE TS-5 MULTIPLE TARGETS COMPLEX

The 388th Range Squadron (RANS) at Hill Air Force Base (AFB) proposes to construct target locales and roadways at the TS-5 Multiple Target Complex (TS-5) on the South Range of the Utah Test and Training Range (UTTR-South). Construction of the target area will be accomplished by vegetation clearing grading of an approximately 4000' x 3000' area. The proposed construction will take place in mid July 2001.

As noted in the *Final EA for Proposed Multiple Targets TS-5, UTTR-South*, produced in May 2000, previous archaeological surveys recorded numerous significant cultural resource sites at TS-5. Due to unevaluated archaeological sites, the archaeological survey report has not yet been accepted by the Utah State Historic Preservation Office (SHPO). The report is in the process of being re-submitted for SHPO concurrence. However, the EA produced a finding of no significant impact (FONSI) for the area.

Target construction and related development activities (e.g., access roads) will be designed to avoid known archaeological sites. No known sites will be impacted by proposed construction. A 300-meter buffer from known archaeological site boundaries will be standard.

Although the SHPO has concurred that there will be no significant impacts to historic properties, Hill AFB realizes that there is potential for inadvertent discoveries of buried archaeological deposits. Given the dynamic nature of the dunal environment, Hill AFB has developed some basic operating procedures to avoid impacts to known or yet undiscovered archaeological sites. The primary strategy for avoiding impacts to cultural resource properties will be rerouting construction around site perimeters. This avoidance strategy will be accomplished by following standards established in the draft Hill AFB cultural resource management plan (CRMP, see below) and through the following methodology:

- Archaeological monitors will be in front of the construction crew at all times. Selective shovel and/or trowel testing and surficial examination of the area will precede mechanical blading when designated by the archaeologist in charge.
- If a site is found, its boundaries will be delineated. The Project Archaeologist and the Hill Air Force Base archaeologist will determine if the site is potentially significant based on local archaeological research themes. This determination will be conservative; consequently, the preferred strategy will be to avoid the site through the realignment of the target
- If a potentially significant site is found and avoidance is not possible, the site area will be avoided by any construction until a mitigation plan can be developed and implemented. The development of a mitigation plan must be done in accordance with the draft Hill AFB CRMP, including consultation with the Utah SHPO, tribal representatives, and representatives of the Air Force.

Principal points of contact for this proposed action include:

388 Range Squadron Commander
Debbie Hall, HAFB Cultural Resources Management Officer

Excerpt from Hill AFB CRMP: Inadvertent Discovery Plan for Cultural Resources

The inadvertent discovery of cultural resources on lands administered by HAFB is always a possibility. The probability exists that buried cultural resources are located in previously surveyed and non-surveyed areas. Thus, it is likely that at some point the inadvertent discovery of a cultural resource may occur.

An inadvertent discovery includes previously unknown cultural resources, human remains, and conditions of inadvertent damage to a known cultural resource or TCP identified in ethnographic studies. When an inadvertent discovery is made, the following steps are to be taken in the absence of a formally approved discovery plan with the SHPO(s):

1. The on-site supervisor, military, civilian, or contractor must immediately report the discovery to the Hill AFB CRPO, and protect the discovery from further damage by halting construction in the vicinity of the discovery. Work may continue outside the vicinity of the discovery.
2. A qualified archaeologist will make an inspection of the discovery to determine its type (number and kinds of features and/or artifacts) and extent, and to determine what actions should be taken to preserve the integrity of the discovery while appropriate notification and consultation is pursued. A comprehensive record shall be maintained describing the nature of the discovery, the conditions under which it was made, personnel contacted and consulted, and immediate actions taken.
3. The Hill AFB CRPO will notify the SHPO, American Indians, and other interested parties of the discovery within three days by telephone, followed by written correspondence.
4. The Hill AFB CRPO, in consultation with a qualified archaeologist, will determine the significance of the discovery from available data. Discoveries will be evaluated within the context of local history and prehistory, and the regional research design. At a minimum, the following criteria will be sufficient to regard a discovery as significant:
 - A. The presence of human remains, with or without associated artifacts or features;
 - B. Evidence of a feature initially interpretable as a habitation structure;
 - C. Occurrence of a single artifact type whose presence is anomalous or rare in the archaeology of the region; also, the occurrence of bone from extinct Pleistocene fauna;
 - D. Evidence that the discovery might have cultural or religious importance to the local community;
 - E. The presence of two or more of the following attributes:
 - i. Two or more artifact classes, as normally constructed in archaeological research;
 - ii. Ten artifacts of the same class presented in apparent subsurface context;
 - iii. Recognizable activity areas or features (the latter including hearths, caches, or trash pits) with high probability of yielding datable material, botanical, or faunal remains;
 - iv. Material preserved in subsurface context that is suitable for age estimation using physical dating techniques; or
 - v. Reasonable expectation that other physical samples could be obtained from the context that would be useful for interpretation of past environment and subsistence practices, such as pollen, macrofossil, and faunal samples.

Note: In those situations where the significance of the discovery is ambiguous, testing by a qualified archaeologist may be conducted to make a determination of significance.

5. The Hill AFB CRPO will consult with the SHPO, American Indians, and other interested parties to determine the appropriate course of action to be taken to protect the integrity of significant discoveries. Since most discoveries are likely to be made as a consequence of ongoing construction or military activities, which becomes expensive when schedules are delayed, all parties are expected to respond quickly. Except in the case of physically large and complex finds it should be possible to complete all consultations and agree upon a mitigation plan through telephone consultations, to be followed with written confirmation. For large or complex discoveries, a written plan shall be prepared for review and approval by the responsible agencies prior to the initiation of any data recovery operations other than those required for the immediate preservation and stabilization of the cultural resource.
6. Discoveries not meeting the stated criteria of significance will receive no additional treatment beyond an initial report of findings, but any additional construction activity in the vicinity will be monitored by a qualified archaeologist in case additional materials that may not have been visible in the initial find are subsequently uncovered.
7. In the event that human remains are discovered, Security Forces shall be contacted immediately. Security Forces must notify the Hill AFB CRPO within four (4) hours and all work at the site must cease until consultation with the CRPO allows further work to be conducted. The remains shall be covered with a tarp or other waterproof material until such time that the archaeologist can arrive on site.

The exposed remains will be brushed clean by a qualified archaeologist to confirm integrity and then exposed areas will be covered with plastic. Topsoil will then be placed over the plastic to minimize public attention. Any artifacts found in association with human remains (funerary objects, sacred objects, and objects of cultural patrimony) will be left in place. The CRPO shall immediately notify the applicable law enforcement and coroner personnel of the human remains discovery. When American Indian human remains are suspected, appropriate American Indian tribes will be contacted within twenty-four (24) hours of discovery. In addition, tribal representatives will be given an opportunity to be present during removal, treatment, and disposition of the remains. Concerning the final disposition of the remains, the NAGPRA consultation process will be invoked, and American Indian tribes culturally affiliated to the remains shall determine repatriation.

In a case where removal of the remains is deemed necessary by legally empowered personnel (law enforcement, coroner, base commanding officer, etc.):

- A. The remains will be carefully and respectfully removed using accepted archaeological recording and excavation techniques. No preservatives, however, will be used on the remains. Human remains and associated grave artifacts will be packaged appropriately and shall remain together through temporary storage to final deposition. The removal of the remains from their discovery context shall be undertaken with the utmost care.
- B. While the remains are in situ or in temporary storage, a qualified specialist will examine the remains to determine gender, stature, obvious pathologies, and manner of death. Metric measurements of skeletal elements will also be made. Photographs, radiographs, and drawings may be made of specific features. No destructive analysis will be conducted on any human remains unless expressly permitted by the interested parties. Nondestructive analyses of associated funerary objects will be by qualified specialists.
- C. The final disposition of any recovered human remains and funerary objects will be determined in consultation with the interested parties. If reburial is undertaken, the remains and all associated funerary objects will be delivered to the designated reburial location in culturally and environmentally (health and safety) appropriate packaging.

APPENDIX B

REPORT ADDENDUM: FURTHER MONITORING OF TS-5-2 TARGET DEVELOPMENT

**REPORT ADDENDUM: FURTHER MONITORING OF TS-5-2
TARGET DEVELOPMENT, UTAH TEST AND TRAINING RANGE,
TOOELE COUNTY, UTAH**

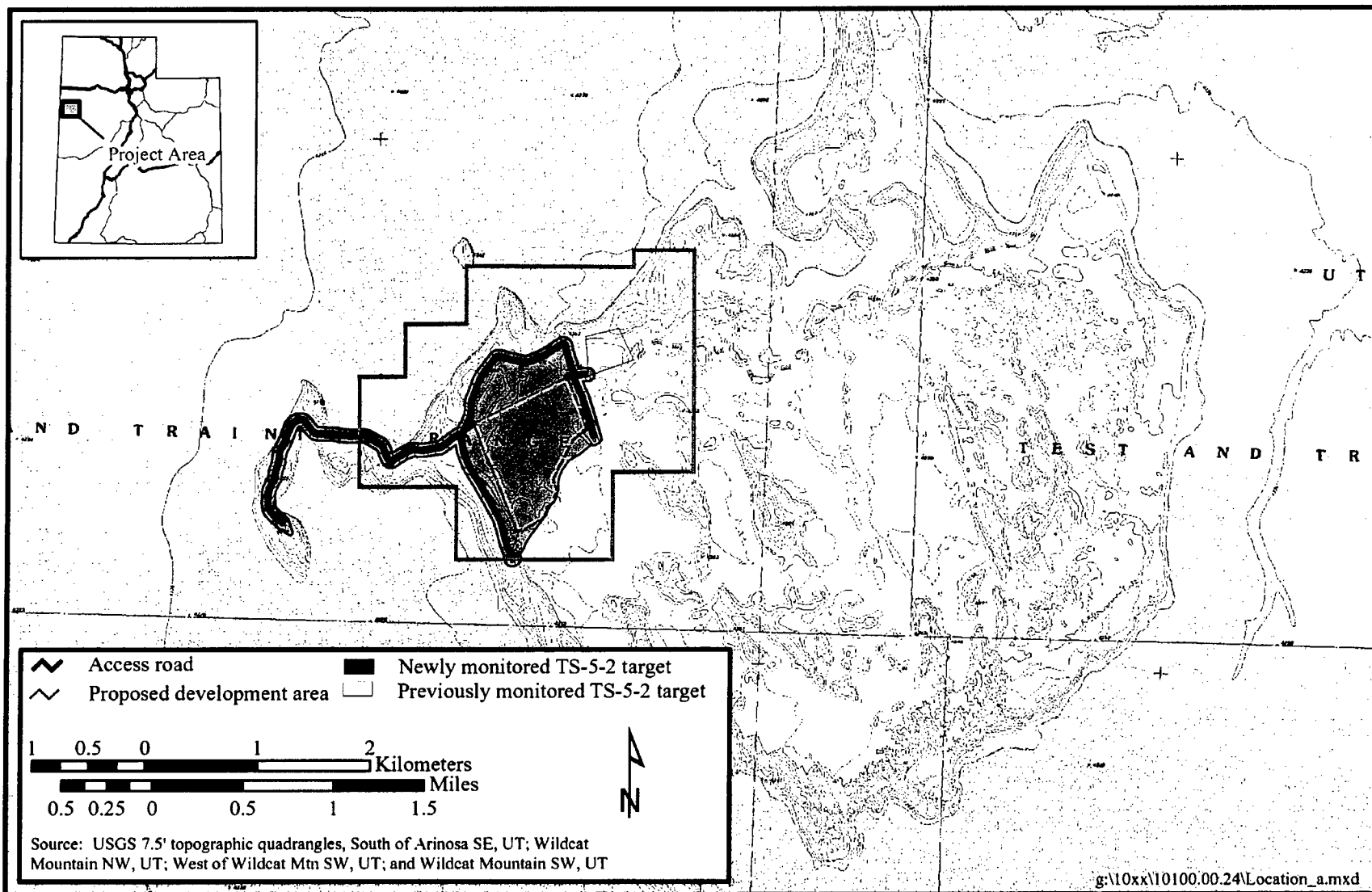
INTRODUCTION

The U.S. Army Corps of Engineers, Fort Worth District, contracted with Geo-Marine, Inc. (GMI), to conduct archaeological monitoring for further development of the TS-5-2 target complex (Figure B-1) for the U.S. Air Force Air Combat Command (ACC) on the Utah Test and Training Range (UTTR). The UTTR is under the jurisdiction of Hill Air Force Base (HAFB) and located in Tooele County, western Utah. Monitoring of ground-disturbing activities was undertaken in July 2001 was undertaken by GMI archaeologist Daron Duke and Hill Air Force Base archaeologist Jaynie Hirschi. The work was conducted under Antiquities Annual Permit No. U-01-GM in compliance with the National Historic Preservation Act of 1966, as amended through 2000 [16 U.S.C. § 470 et seq., P.L. 89-665, Stat. 915], and according to a Standard Operating Procedure (SOP) developed for monitoring by GMI. The HAFB Cultural Resources Management Plan (CRMP) specifies that any ground-disturbing activities in sensitive areas require archaeological monitoring to ensure proper treatment of any new discoveries and avoidance of recorded sites.

The project consisted of further developments of the TS-5-2 target, which began with an adjacent area to the northeast in January 2001. This expansion will be referred to as the southern TS-5-2 target area. Monitoring took place in July and August of 2001. The removal of vegetation and a thin layer of soil, typically less than 3 feet (ft) below the surface, by a bulldozer was the primary impact. Previous archaeological surveys of TS-5 area documented numerous sites in dune blowouts and identified the area as possessing potential for containing important buried cultural deposits beneath adjacent sand dunes. Based on these surveys, the target area was designed to avoid known sites. Since the potential for sites is high, the monitoring objective was to ensure that new discoveries were not destroyed during construction or future bombing. Because of the potential for buried sites, backhoe trenches were placed across the area to assess the subsurface. The results of the monitoring and geomorphological investigation of the subsurface indicate that the further developments of the TS-5-2 target will have no effect on cultural resources.

The following discussion is presented as a TS-5 monitoring report addendum since the project background, setting, and conditions, which are found in this volume, did not change, and no cultural resources were found. A description of the additional monitoring and discussion of results are presented in this addendum.

B-4



B-1. Map of TS-5-2 project area.



Figure B-2. Overview TS-5-2 target development (looking northeast).

PROJECT DESCRIPTION

Construction of the southern TS-5-2 target took place immediately southwest of the earlier constructed target in south Section 27 and north Section 34 of Township 4 South, Range 15 West. A block area 178 acres (718,860 m²) in size was cleared of vegetation, and high spots with small dunes were leveled (Figure B-2). Additionally, a road surrounding the target area was constructed to provide access to video camera pads, to be placed at as yet to be determined locations along the road. Monitoring was conducted to consider impacts to the total area within the camera pad access roads that surround the cleared area. This consists of a total area of 213 acres (861,980 m²), including the vegetation cleared target itself. An additional camera access road extends 1.7 miles (2.7 km) to the west and south, following isolated dunes into the mudflats. This road was monitored for a 400-ft corridor, this area totaling 84 acres (339,936 m²). Combined, a total of 297 acres (1,201,916 m²) were monitored on the southern TS-5-2 target project. The following discussion presents the monitoring results and management recommendations for the second TS-5-2 target project.

METHODS

All ground-disturbing activities were monitored with the same methods used during the earlier TS-5-2 effort. This included examination of the ground surface revealed behind bulldozers and graders removing vegetation. Within the intended target area, subsurface investigations using a backhoe were conducted to look for buried cultural deposits that could be destroyed by future bombing.

The archaeology of the TS-5 area largely consists of Paleoarchaic lithic scatters situated on the mudflats, and deposited by humans when the area was a freshwater marshland approximately 9,000-10,000 years ago, prior to the desiccation that brought on the modern dune complex. Sites are scarce on the dunes; later peoples had little reason to come to TS-5 (although there are cultural resources indicating that they occasionally passed through). Areas where impacts would potentially affect the Paleoarchaic surface were the primary monitoring concern, although all areas were monitored.

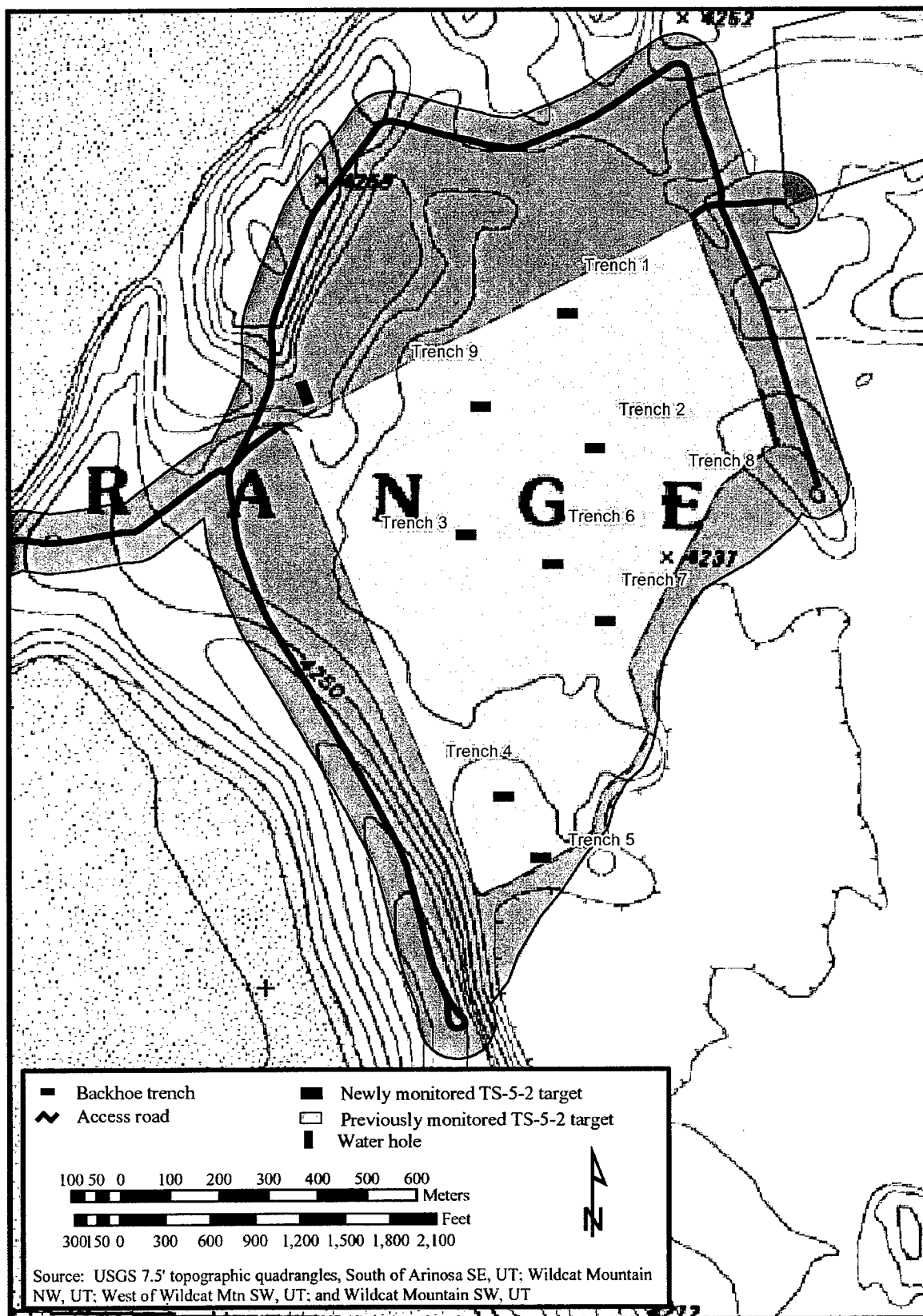
The project area consists of a topographic depression surrounded for approximately two-thirds of its area by large aeolian dunes typical of the TS-5 dune complex. This area has been surveyed (Arkush 1997; Carter 1999), and no cultural resources were identified. As bulldozers and graders scraped vegetation and leveled the target area and camera road, archaeologists followed and examined the uncovered surface for charcoal stains and artifacts. The depth of this disturbance ranged from less than 2 inches (in) (5 centimeters [cm]) on level areas to approximately 3 ft (~1 meter [m]) where small dunal rises were leveled.

Subsurface investigations were conducted in the target area itself because this low-lying area possesses a thin aeolian surface less than 4 ft (1.2 m) thick over the level of neighboring mudflats, and therefore, the Paleoarchaic surface. This depth is within range of impact by future bombing. A series of nine 5-m (16.4-ft) long backhoe trenches were spread across the target area to monitor for potential buried cultural deposits (Figure B-3). Because this potential is considered extremely low in the dunes themselves, and there are no surface indications that sites would be present, trenches were deemed unnecessary on the dunes. Previous trench excavations at the north target indicated that the any buried Paleoarchaic deposits would not be located on dunes, but rather, near a stratum of fine to medium sands deposited by braided stream channels in the early Holocene (Carter and Young 2002). These sands lie on top of the massive clay and marl of pluvial Lake Bonneville. Trenches were therefore excavated to the Lake Bonneville marl which was encountered no lower than 6.5 ft (~2 m) beneath the surface in the target area. Since trench profiles were similar to those in the north target, where detailed analysis was conducted, intensive geomorphological examination was not conducted on the south target trenches; rather, profile descriptions were made as necessary to recognize any potential cultural resources relative to the occurrence of the primary strata (i.e., dune, Early Holocene stream channel, and Pleistocene lake deposits).

RESULTS

No cultural resources were encountered during the second phase of TS-5-2 target development monitoring. No artifacts or soil staining was apparent on the surface where vegetation was removed. Backhoe trenches also revealed no cultural remains. Nine trench profiles showing the primary strata are presented in figures B-4 and B-5. A cursory profile for a large water hole excavated by the 388th Range Squadron was also taken (see Figure B-5).

Four strata were documented. Stratum I is part of the modern dune complex, consisting of what Young described at the north target as "sandy silts of playette and reworked Dune III," Dune III being the most recent dune-building episode at TS-5. Stratum II is generally a silty or sandy clay layer, but sometimes occurs as a sandy loam. It is possible that this layer is part of the old surface on which Paleoarchaic activities were conducted (Craig Young, personal communication), but further geomorphological analysis where cultural materials are associated (a context not yet



B-3. Backhoe trenches excavated at southern TS-5-2 target.

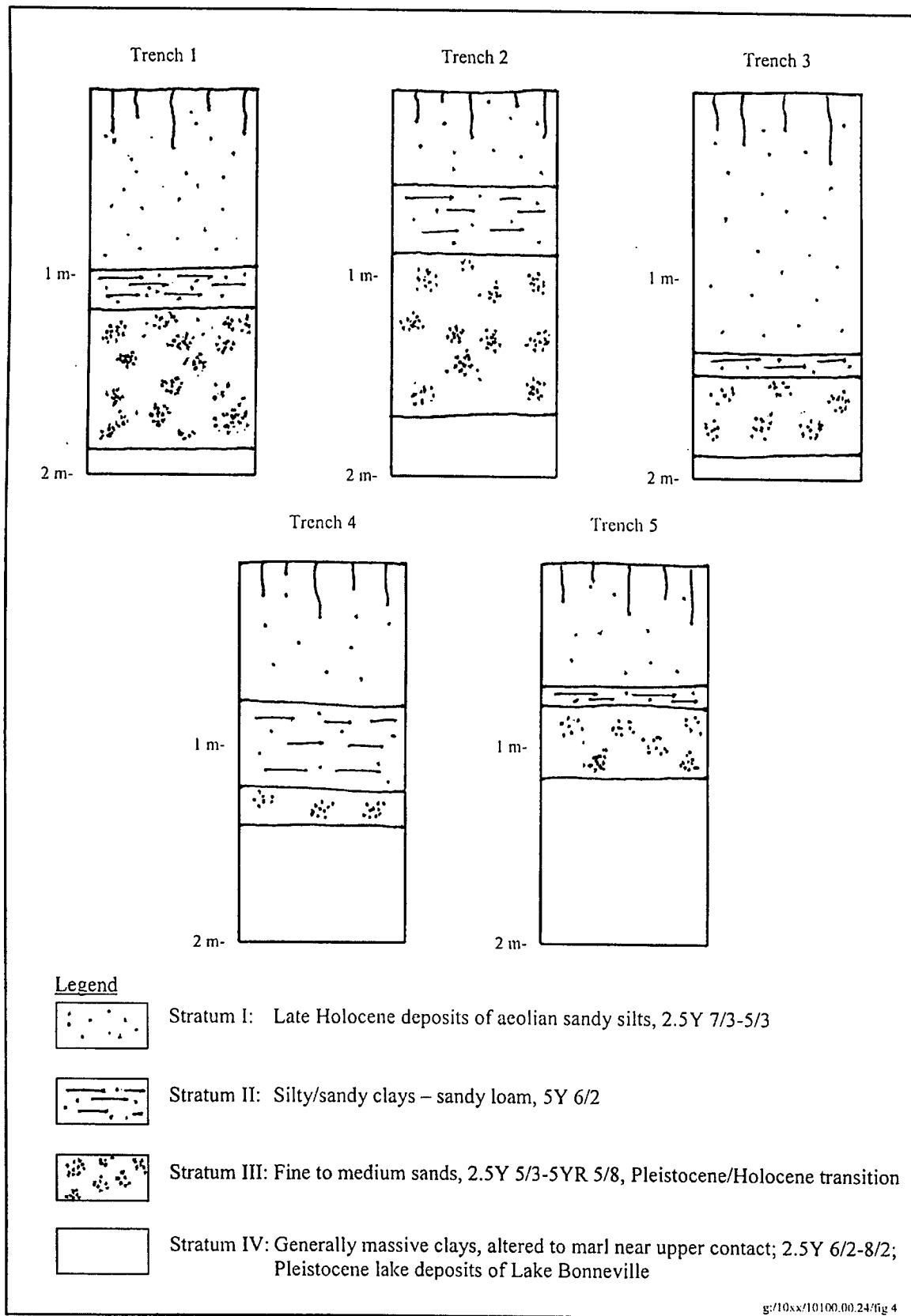


Figure B-4. Trench 1, Trench 2, Trench 3, Trench 4, and Trench 5 at southern TS-5-2 target.

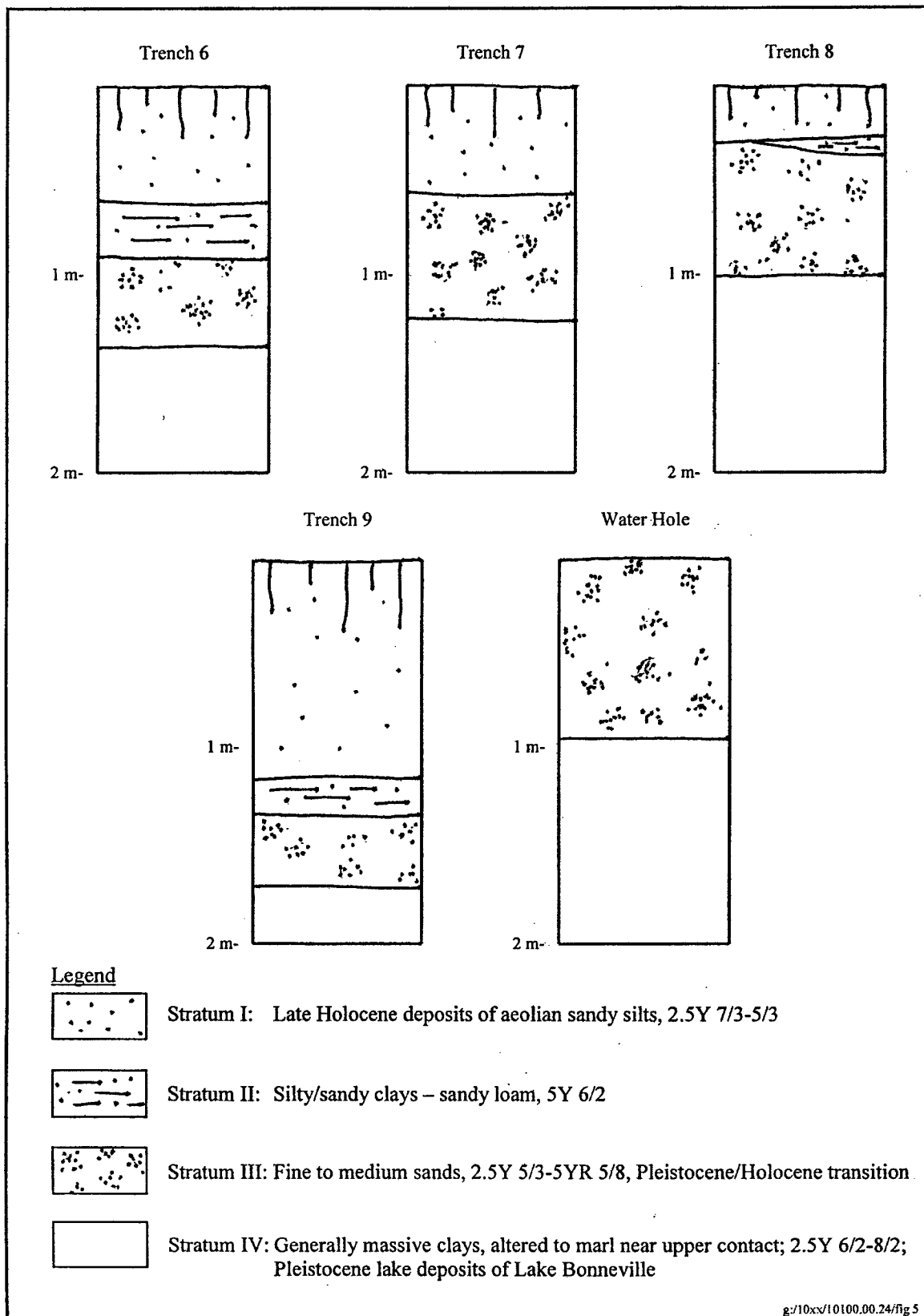


Figure B-5. Profiles of Trench 6, Trench 7, Trench 8, Trench 9, and water hole at southern TS-5-2 target.

discovered at TS-5) is needed to make this determination. Stratum III consists of fine to medium grained sands, occasionally ranging to sandy clay. These deposits are believed by Young to be remnants of an paleo-distributory stream channels emptying into the receding Lake Bonneville's southern margin near TS-5 (also see Carter and Young 2002:18-19) at the time of Paleoarchaic occupation. Stratum IV represents the Pleistocene lake bottom deposits of Lake Bonneville, and consists of massive clay altered to marl near the upper contact with Stratum III.

Additional geomorphological analysis was conducted during a May 2002 visit to TS-5 by archaeologists working south of the area on Dugway Proving Grounds. David Madsen and Jack Oviatt examined an exposed profile in the water hole excavated by the 388th. Further examination of soil samples taken from the profile should provide more detailed data regarding the developmental history of TS-5. This will be valuable information for more efficient management of cultural resources on TS-5.

RECOMMENDATIONS

Surface and subsurface investigations indicate that neither ground-disturbing activities associated with target development nor future activities associated with target maintenance and bombing will affect cultural resources. Archaeological monitoring of road and target building activities revealed no cultural resources. Areas within a 400-ft corridor from video camera locations and access roads, as well as TS-5-2 target area bounded by the access roads, are cleared for activity.

Any future work on the TS-5 dune complex should continue to follow the monitoring procedures used at TS-5-2. Monitoring should focus on the potential for Paleoarchaic deposits, which are known to occur at approximately the level of the mudflats in dune blowouts and beneath dunes. Backhoe trenching has identified the stratigraphic layers with which these deposits should be associated, and trenching should always be conducted where any future bombing can impact to the depth of these layers. The potential for cultural deposits on the dunes is lower, but visual monitoring of ground disturbing activities should continue.

REFERENCES CITED

Carter, J., and D. C. Young, Jr.

2002 *TS-5 Central Area and Craners Cultural Resources Inventory, Utah Test and Training Range, Tooele and Box Elder Counties, Utah*. Submitted to Hill Air Force Base and National Park Service, Contract No. 1443-CX-2000-99-003. Copies available from Hill Air Force Base, Ogden.

CONTRACT DATA

This study was prepared for
Hill Air Force Base, Utah Test and Training Range, Tooele County, Utah

by
Daron G. Duke

with a contribution by
D. Craig Young, Jr.
Far Western Anthropological Group, Inc.
P.O. Box 9982
Reno, Nevada 89507

U.S. AIR FORCE AIR COMBAT COMMAND SERIES
REPORTS OF INVESTIGATIONS
NUMBER 12

Geo-Marine, Inc.
2255-A Renaissance Drive
Las Vegas, Nevada 89119

for
U.S. Air Force Air Combat Command
Hill Air Force Base
and
388th Range Squadron

under
U.S. Army Corps of Engineers, Fort Worth District
Contract No. DACA63-99-D-0010, Delivery Order No. 0024
(GMI Project No. 1010-D24)

Utah Division of State History Report No. U-01-GM-0831m

June 2002

United States Air Force
Air Combat Command